

IN THE CLAIMS:

Please amend the claims according to the following listing, in which insertions are indicated by underline and deletions are indicated by strikethrough or double brackets. This listing of claims will replace all prior versions, and listings, of claims in the application.

1. (Currently Amended) A gear-shifting apparatus which comprises:

a chain;

a plurality of gear-shifting sprockets arranged in an axis direction; and

a changing mechanism for changing the chain from one of the plurality of gear-shifting sprockets to a selected other one of the plurality of gear-shifting sprockets in response to a gear-shifting operation, the changing mechanism comprising:

a guide pulley which is movable in the axis direction and which is operable to guide the chain to the selected other one of the plurality of gear-shifting sprockets,

and a pulley support member which rotatably supports the guide pulley to which the chain is wound, and which is movable in the axis direction by means of the gear-shifting operation, the pulley support member comprising:

a first arm part disposed on a first side of the pulley,

a second arm part disposed on a second side of the pulley,

a spring-containing part operatively attached to the second arm part, and

a pulley axle which extends through the first arm part, the second arm part, the pulley and the spring-containing part;

wherein the pulley support member is provided with engagement recovery parts for causing a derailed portion of the chain, which has been derailed from an orbital plane of the guide pulley, to engage with the guide pulley,

wherein the engagement recovery parts include a first extending part and a second extending part, which are arranged respectively on two sides in the axis direction of the orbital plane of the guide pulley, and which each extend in a respective direction away from the orbital plane of the guide pulley, the first extending part being integrally formed with the first arm part of the pulley support member, and the second extending part being integrally formed with the spring-containing part, and

wherein each of the extending parts is operable to guide a derailed portion of the chain, which has gone onto the extending part, in a way that the derailed portion of the chain slides on the extending part, moves towards the orbital plane of the guide pulley, and thereafter engages with the guide pulley, due to a tension force on the chain.

2. (Currently Amended) The gear-shifting apparatus according to claim 1, wherein the gear-shifting apparatus comprises a tension pulley,

wherein the pulley support member includes a holder for rotatably supporting the guide pulley, and an arm for rotatably supporting the tension pulley which is supported by the holder, and which applies a tension force to the chain,

wherein the first extending part is molded integrally with the arm,~~and~~

~~wherein the second extending part includes a spring-containing part for containing a tension spring to generate a spring force with which to push the tension pulley against the chain.~~

3. (Original) The gear-shifting apparatus according to claim 1,

wherein the plurality of gear-shifting sprockets are sequentially arranged in a way that a gear-shifting sprocket with a larger outer diameter comes next to a gear-shifting sprocket with a smaller outer diameter on a side in the axis direction,

wherein the first extending part and the second extending part are arranged respectively at the side of the orbital plane of the guide pulley and on opposed sides in the axis direction, and

wherein a guide surface onto which the derailed part can go in the first extending part is located in a position whose distance from a centerline of rotation of the guide pulley is smaller in comparison with the guide surface onto which the derailed part can go in the second extending part.

4. (Original) The gear-shifting apparatus according claim 2,

wherein the first extending part is provided so as to extend into a position which makes the first extending part seem to overlap with the tension pulley when viewed from a side, and

wherein a width in the axis direction of the first extending part is almost equal to a width in the axis direction of the chain.

5. (Currently Amended) The gear-shifting apparatus according to claim 2,

wherein one of the ~~arm includes a~~ first arm part and ~~[[a]]~~ the second arm part, ~~one of which~~ is arranged in the axis direction on a first side respectively of the orbital planes of both the guide pulley and the tension pulley, the other of which is arranged in the axis direction on a second side respectively of the orbital planes of both the guide pulley and the tension pulley,

wherein the first arm part is provided with the first extending part,

wherein the second arm part is provided with the spring-containing part so that the spring-containing part is next to the second arm part in the axis direction, and

wherein, while the second arm part is arranged in the axis direction between the guide pulley and the spring-containing part, an outermost edge of the second arm part in the radial direction is located in a position whose distance from a centerline of rotation of the guide pulley is equal or

smaller in comparison with a guide surface onto which the derailed part can go in the spring-containing part.

6. (Currently Amended) The gear-shifting apparatus according to claim 5,

wherein a width in the axis direction of the first extending part is almost equal to a width occupied in the axis direction by two [a]] gear-shifting sprockets of the plurality of gear-shifting sprockets which are adjacent to one another in the axial direction, and

wherein a width in the axis direction of the second extending part is larger than the width in the axis direction of the first extending part.

7. (Currently Amended) A gear-shifting apparatus ~~which includes~~ comprising:

a chain;

a plurality of gear-shifting sprockets arranged in an axis direction; and

a changing mechanism for changing the chain from one of the plurality of gear-shifting sprockets to a selected one of the plurality of gear-shifting sprockets in response to a gear-shifting operation,

the changing mechanism ~~including~~ comprising:

a tension pulley for applying a tension force to the chain,

an arm which rotatably supports the tension pulley, the arm moving in the axis direction due to the gear-shifting operation,

wherein, near a part of the tension pulley which leads in the chain, the arm is provided with engagement recovery-guiding parts for respectively causing derailed parts of the chain, which are derailed from an orbital plane of the tension pulley, to engage with the tension pulley, the

engagement recovery-guiding parts configured to be substantially symmetrical to one another as seen in cross-section, and to diverge outwardly away from one another at a distal end of the arm; and

wherein the engagement recovery-guiding parts respectively guide the derailed parts in such a way that the entire derailed parts are positioned outwards in the axis direction from a rotation track of an outermost peripheral edge of the tension pulley, and in a way that the derailed parts move towards the orbital plane of the tension pulley due to the tension force on the chain and thereafter engage with the tension pulley.

8. (Currently Amended) The gear-shifting apparatus according to claim 7, wherein the changing mechanism ~~includes~~ further comprises:

a guide pulley for guiding the chain hooked to the selected one of the plurality of gear-shifting sprockets; and

a holder which rotatably supports the guide pulley, and which can move in the axis direction along with the arm,

wherein the arm includes a pair of arm parts, one of which is arranged on a first side respectively of both the tension pulley and the guide pulley in the axis direction, and the other of which is arranged on a second side respectively of both the tension pulley and the guide pulley in the axis direction,

wherein, each of the arm parts comprises a tension-pulley-side guide part for preventing a part of the chain, which is hooked to the tension pulley, from coming off, and supported parts which are supported by the holder, and

wherein an interval in the axis direction between the two supported parts is larger than an interval in the axis direction between the two tension-pulley-side guide parts.

9. (Original) The gear-shifting apparatus according to claim 8, wherein, a center plane is defined as the plane which includes both a centerline of rotation of the tension pulley and a centerline of rotation of the guide pulley, and

wherein a range in a circumferential direction where each of the engagement recovery-guiding parts is formed is the range which comprises a first angle in a forward rotational direction about the centerline of rotation of the tension pulley with respect to the center plane almost equal to a second angle in a backward rotational direction about to the centerline of rotation of the tension pulley with respect to the center plane when viewed from the side.

10. (Original) The gear-shifting apparatus according to claim 7,

wherein the arm includes a pair of arm parts, which are arranged respectively on opposed sides in the axis direction with respect to the tension pulley, and in which the engagement recovery-guiding parts are formed respectively,

wherein each of the engagement recovery-guiding parts includes a guide surface with which one of the derailed part comes into contact, and which extend in the axis direction and in a direction away from the orbital plane, and

wherein an end part which is the closest to the tension pulley in the axis direction in each of the guide surfaces is located in almost the same position as an inner peripheral edge of the chain engaging with the tension pulley is located.

11. (Currently Amended) A gear-shifting apparatus which comprises:

a chain;

a plurality of gear-shifting sprockets arranged in an axis direction; and

a changing mechanism for changing the chain from one of the plurality of gear-shifting sprockets to a selected one of the plurality of gear-shifting sprockets in response to a gear-shifting operation,

the changing mechanism comprising: including

a guide pulley which moves in the axis direction and guides the chain hooked to the selected one of the plurality of gear-shifting sprockets, the guide pulley defining comprising an orbital plane of the guide pulley,

a pulley support member which rotatably supports the guide pulley to which the chain is wound, and which moves in the axis direction by means of the gear-shifting operation, the pulley support member comprising:

a first arm part disposed on a first side of the pulley,

a second arm part disposed on a second side of the pulley,

a spring-containing part operatively attached to the second arm part, and

a pulley axle which extends through the first arm part, the second arm part, the pulley and the spring-containing part;

a tension pulley for applying a tension force to the chain, and

an arm which rotatably supports the tension pulley, the arm moving in the axis direction due to the gear-shifting operation,

wherein the pulley support member is provided with engagement recovery parts for causing a derailed portion of the chain, which has been derailed from an orbital plane of the guide pulley, to engage with the guide pulley, wherein the engagement recovery parts include a first extending part and a second extending part which are arranged respectively on two sides in the axis direction of the orbital plane of the guide pulley, and which each extend in a respective direction away from the

orbital plane of the guide pulley, the first extending part being integrally formed with the first arm part of the pulley support member, and the second extending part being integrally formed with the spring-containing part, and

wherein the arm is provided with engagement recovery-guiding parts for respectively causing derailed parts of the chain, which are derailed from an orbital plane of the tension pulley, to engage with the tension pulley.

12. (Currently Amended) The gear-shifting apparatus according to claim 11, ~~wherein the engagement recovery parts include a first extending part and a second extending part, which are arranged respectively on opposed sides in the axis direction of the orbital plane of the guide pulley, and which extend in a direction away from the orbital plane of the guide pulley and in the axis direction, and~~

wherein each of the extending parts guides the derailed portion of the chain, which has gone onto the extending part, in a way that the derailed portion of the chain slides on the extending part, moves towards the orbital plane of the guide pulley, and thereafter engages with the guide pulley, due to the tension force on the chain.

13. (Original) The gear-shifting apparatus according to claim 11, wherein the arm is provided with engagement recovery-guiding parts near a part of the tension pulley which leads in the chain, and

wherein the engagement recovery-guiding parts respectively guide the derailed parts in a way that the entire derailed parts are positioned outwards in the axis direction from a rotation track of an outermost peripheral edge of the tension pulley, and in a way that the derailed parts move towards the

orbital plane of the tension pulley due to the tension force on the chain and thereafter engage with the tension pulley.

14. (Currently Amended) The gear-shifting apparatus according to claim 11, wherein the gear-shifting apparatus is enclosed within a case, and wherein the changing mechanism further ~~includes~~ comprises a link mechanism which is rotatably secured at one end to the case, and is secured at a second end to the holder, the link mechanism being operative to move the holder and the guide pulley both in the axis direction and in a direction substantially normal to the axis direction in response to a gear-shifting operation.

15. (Original) The gear-shifting apparatus according to claim 14, wherein the link mechanism comprises a pair of elongate links.

16. (Currently Amended) A transmission apparatus for a bicycle, comprising:

- a hollow housing;
- a crankshaft extending through said hollow housing and being rotatably supported thereon;
- a drive input sprocket operatively attached to said crankshaft and concurrently rotatable therewith, said drive input sprocket disposed inside of said housing;
- an output axle having a gear-supporting portion disposed in said hollow housing and rotatably supported thereon, said output axle having a central axis and further comprising an outer end portion extending outwardly from said housing;
- a plurality of spaced apart gear-shifting sprockets operatively attached to said output axle and concurrently rotatable therewith, said gear sprockets disposed inside of said housing;

a chain extending between said drive input sprocket and a selected one of said gear-shifting sprockets

a drive output sprocket operatively attached to the outer end portion of said output axle and being concurrently rotatable therewith, said drive output sprocket disposed outside of said housing;

a changing mechanism for changing the chain from one of the plurality of gear-shifting sprockets to a selected other one of the plurality of gear-shifting sprockets in response to a gear-shifting operation, the changing mechanism comprising:

a guide pulley which is movable through an orbital plane in a direction substantially parallel to the central axis of the output axle and which is operable to guide the chain to another selected one of the plurality of gear-shifting sprockets,

and a pulley support member which rotatably supports the guide pulley to which the chain is wound, and which is movable in the axis direction by means of the gear-shifting operation, the pulley support member comprising:

a first arm part disposed on a first side of the pulley,

a second arm part disposed on a second side of the pulley,

a spring-containing part operatively attached to the second arm part, and

a pulley axle which extends through the first arm part, the second arm part, the pulley and the spring-containing part;

wherein the pulley support member is provided with engagement recovery parts for helping guide a derailed portion of the chain to engage with the guide pulley if a portion of the chain becomes derailed from an orbital plane of the guide pulley,

the engagement recovery parts comprising first and second extending parts arranged on opposite sides of the orbital plane of the guide pulley, the first extending part being

integrally formed with the first arm part of the pulley support member, and the second
extending part being integrally formed with the spring-containing part.

17. (Original) A bicycle incorporating the gear-shifting apparatus of claim 1.
18. (Original) A bicycle incorporating the transmission apparatus of claim 16.
19. (New) The gear-shifting apparatus of claim 11, wherein the engagement recovery-guiding parts are configured to be substantially symmetrical to one another as seen in cross-section, and to diverge outwardly away from one another at a distal end of the arm.